REMARKS

Entry of this Amendment and reconsideration of the above-identified application in view of the following is respectfully requested

Claims 1-14 are pending and stand rejected.

Claims 1 and 14 are independent claims.

No claims have been amended.

Claims 1, 2, 6, 7, 8, 9 and 10-14 stand rejected under 35 USC 103(a) as being unpatentable over Friend (USP no. 6, 429, 601) in view of Aoki (USPPA 2002/0003520). Claims 3, 4 and 5 stand rejected under 35 USC 103(a) as being unpatentable over Friend and Aoki in view of Yamazaki (USP no. 6, 326, 941).

In maintaining the rejection of the claims, the Office Action refers to Figures 7 and 8 of Friend to assert that Friend teaches that a brightness may be achieved by turning the signal on and off for an appropriate number of times and duration during a cycle. The Office Action states, "during three cycles shown in FIG. 8 the brightness of the pixel is increased from around 10% to around 40%. The on-time of the pixel is applied as a series of pulses of equal length t.sub.p which, when added together, give the total on-time per cycle needed to achieve the required duty cycle. With the total on-time per cycle kept the same, the pattern of current between the on time and the off time can be varied to suit other requirements..." The Office Action refers to "Aoki for teaching it is preferable that the display device comprise a sub-frame generating means which time-divides a fame displaying one picture into multiple sub-frames, an attenuation signal generating means for generating an attenuation signal by dividing an inputted luminosity signal by a designated attenuation coefficient and a signal switching means for inputting the luminosity signal before division and inputting the attenuation signal after division to the subsequent sub-frame. Thus Aoki teaches applying a second subfame that is an attenuated signal of the first subframe, the first not-zero current will always be determined as a known ratio of

the second non-zero current, since the ratios are determined before, i.e., Sc1 is 1/1 of Sc, or 4/1 or Sc3 and Sc2 is ¼ of Sc1, see fig. 8."

The Office Action further states "[h]owever, as noted above the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. Friend is relied upon to teach applying the total brightness of the frame in divided subframes and Aoki is relied upon to teach said second non-zero current during said second sub-period achieving a brightness that is a known percentage of a brightness achieved by said first non-zero current in said first sub-fame."

Applicant thanks the Examiner for providing further rationale for maintaining the rejection of the claims in reply to Applicant's prior response. As the claims have been rejected citing the same references as in the prior Office Action, applicant repeats, as if in full herein, the remarks made in Applicant's prior response.

In addition, in response to the further rationale provided in the Office Action in maintaining the rejection of the claims, Applicant submits that Friend teaches that a "first way of fixing the brightness is by turning the pixels on and off rapidly with a duty cycle that achieves the desired brightness from each pixel when averaged over time… For instance, if half-brightness is desired (e.g., a brightness of 32 in 64 grey-scale scheme mentioned above), the **pixel is switched so as to be fully on for half of the time and fully off for half of the time.**" (col. 6, line 66-col. 7, line 5).

Friend further discloses that the number of "on" driving signals and the duration of the "on" time is dependent upon the desired level of brightness. However, the current or voltage applied is always a current or voltage that produces **a fully on pixel**.

Referring to Figure 8, Friend discloses that brightness levels between 10 and 40 percent may be achieved with application of a different number of drive signals or pulses. Friend further discloses that "[d]uring the three cycles shown in

Fig. 8, the brightness of the pixel is increase from around 10% to around 40%. The on-time of the pixel is applied as a **series of pulses of equal length** ... which, when added together, together the total on-time per cycle needed to achieve the required duty cycle" (see col. 7, lines 27-33). For example, with a single "on" pulse of a known duration and a known voltage in a first cycle a 10% brightness is achieved and with four, substantially, equal "on" signals in the third cycle, each "on" signal being of a known voltage (current) and duration a 40% brightness is achieved. Other levels of brightness may be achieved with the application of a different number of pulses or drive signals.

As shown in Figures 7 and 8, an "on" condition is represented as the application **of a full current for a specified time duration** (period) A level of brightness is then achieved by the number of "on" conditions allocated during the frame with a desired duty cycle.

Friend fails to provide any disclosure regarding a modulation or alteration of the applied current (or voltage) to the pixel during the "on" time. Rather, Friend specifically teaches that **the pixel is switched fully on during the on time and fully off during the off time.** There is no discussion regarding any voltage value other that a voltage (current) that would produce a fully on or a fully off condition. In fact, any voltage or current other than fully on would cause a difference in the brightness level achieved during an "on" time that would require a different number of pulses to be generated to achieve a desired overall brightness.

Even if it could be said that a voltage between the fully on and fully off condition disclosed by Friend could be considered, then such a voltage would introduce a complexity that is beyond the teachings of Friend. Friend, as previously discussed, teaches setting a half-brightness condition in a 64 grey-scale scheme (i.e.., a brightness of 32 in 64 grey-scale scheme) by switching the pixel fully on half the time and switched fully off for the other half of the time. Thus, Friend teaches determining a duty cycle to achieve a desired brightness with a known duration of a pulse of a voltage (current) that produces a fully on pixel brightness level Friend does not consider setting the voltage in the "on"

period to any other value than that voltage that achieves a fully on condition during the "on" time.

Aoki teaches a system where a frame displaying one picture is time divided into multiple sub-frames and the brightness of the subsequent sub-frame is attenuated at a designated ratio according to the brightness of the inputted picture.

Thus, the brightness level of the subsequent (i.e., second) frame is a function of a brightness level that is provided in the first frame. However, the brightness level of the first frame is the desired brightness level of the pixel. See, for example, para. 0012, of Aoki, which states "[i]t is preferable that the display device comprises a sub-frame generating means which time-divides a frame displaying one picture into multiple sub-frames, an attenuation signal generating means for generating an attenuation signal by dividing an inputted luminosity signal by designated attenuation coefficient and a signal switching means for inputting the luminosity signal before division to the antecedent sub-frame in the relevant frame and inputting the attenuation signal after division to the subsequent sub-frame in the relevant frame."

Thus, Aoki teaches that the luminosity signal (full brightness) is applied in the first frame and an attenuated signal is applied in the second frame.

In addition, Aoki discloses that the second signal is determined as a ratio of the first signal. That is the second signal is a known fraction (e.g., 1/4) of the first signal.

However, Aoki does not disclose the element of "said at least first and second non-zero current over their respective sub-periods substantially yielding said overall brightness level." Rather, **Aoki teaches that the signal (i.e., first current) in the first frame is the signal to achieve the luminosity (full brightness) and the second current is a portion (i.e., ¼) of this luminosity signal**.

Thus, according to Aoki, the brightness of the pixel is increased above the desired brightness level because a portion of the voltage is applied to the pixel

during the second period after the brightness level has been achieved during the first subperiod. (see para. 0059-0060).

Aoki further fails to teach the element of "said first non-zero current is determined based on a known ratio with respect to said second non-zero current." Rather, Aoki teaches that the second non-zero current is based on a known ratio with respect to the first non-zero current.

Assuming that the subperiods of Aoki can be incorporated into the teachings of Friend, then an individual "on" period of Friend would be comprised of a first subperiod and a second subperiod and the "fully on" voltage (described by both Friend and Aoki) would be applied during the first period and a reduced voltage (ratio of the voltage in the first sub-period described by Aoki) would be applied during the second period.

As the brightness obtained from the two subperiods is greater than the desired brightness, then the combination of Friend and Aoki would fail to teach the element of "said at least first and second non-zero current over their respective sub-periods substantially yielding said overall brightness level."

Furthermore, as each of the "on" times produces a brightness that is greater than a desired brightness, (see para. 0059-0060, Aoki), then the duty cycle disclosed by Friend (i.e., half brightness 32 in 64 grey-scale being half on and half off) must be altered to compensated for the additional brightness level achieved during each of the "on" times. Thus, assuming that a 25 percent increase in the brightness level (as disclosed by Aoki) is achieved during each "on" time of Friend, then the "on' time (Figure 8, cycle 1 for example) would have to be reduced by 25% (assuming that the increased voltage during the "on" time duration and increased brightness are in a 1:1 ratio) to achieve an "overall brightness" in the "on' time and not the greater brightness disclosed by Aoki. Similarly, the third cycle (40% brightness case) would have an alteration of the duty cycle to compensate for the increased brightness achieved during each "on" time. The exact alteration of the duty cycle is determined based on the

relationship of the brightness level achieved for each period, the number of periods and the duration that a voltage is applied.

Thus, in the half brightness condition (32 in a 64 grey-color scheme) disclosed by Friend rather than a duty cycle of half on/half off, the duty cycle must be altered to compensate for the 25% increase in the brightness cases by the fractional voltage applied during the second subperiod (Aoki) .

The alterations of the duty cycle is not considered or contemplated by either Friend or Aoki. Friend specifically teaches a half on/half off duty cycle to achieve half brightness, for example.

Alternatively, rather than altering the duty cycle, the duration of the first and second subperiods may be adjusted to provide for an overall brightness. However, neither Friend nor Aoki disclose any alteration of the duration of the first and second subperiods so that application of a full voltage during the first subperiod and the application of a portion of the full voltage during the second subperiod would teach the element of "said at least first and second non-zero current over their respective sub-periods substantially yielding said overall brightness level."

In a further alternative, the voltage in the first subperiod may be reduced to compensate for the application of a reduced voltage in the second subperiod to provide for an overall brightness. However, neither Friend nor Aoki teaches an alteration of the voltage during the first subperiod. As previously discussed any voltage or current that does not produce a fully "on" condition in Friend alters the principle of operation of Friend.

As an example, assuming an overall brightness level of 10% (cycle 1, Figure 8) is desired, then the combination of Friend and Aoki would require the single pulse be divided into two subperiods, where a full voltage is applied during the first subperiod and a portion (1/4) of the full voltage is applied during the second subperiod. In this case, a brightness greater than the desired 10% would be achieved with the addition of the subperiods of Aoki into the device of Friend. (see para. 59-60, Aoki).

To compensate for the higher brightness level, the duration of the pulse must be adjusted or the duration of the first and second subperiods must be appropriately adjusted or the voltage in the first subperiod must be reduced to compensate for the voltage applied during the second period to achieve the overall brightness level of 10%.

Neither Friend nor Aoki teach or suggest these further modifications.

Accordingly, the modification of the teachings of Friend by Aoki would incorporate the subdivision of "on" time periods into a first and a second subperiod and a variable voltage settings for the second subperiod. But the combination of Friend and Aoki would have to be further modified to include alteration of the subperiod timing or the duty cycle of the "on" time to achieve the overall brightness rather than the increased brightness taught by Aoki. Alternatively, Friend would have to be modified to provide for a variable voltage in the first subperiod of the "on" time, which is contrary to the teachings of both Friend and Aoki.

These further alterations of the subperiods, the duty cycle and/or alteration of the voltage in the first subperiod is not disclosed or considered by either Friend or Aoki.

Although the Office Action refers to "what the combined teachings of the references would have suggested" to render the subject matter recited in the claims as being unpatentable, applicant submits that even if the teachings of Aoki were combined with the teachings of Friend not only would the combination fail to recite all the elements claimed, but that significant modification, either to the duration of the subperiods, the duty cycle or to the voltage applied in the first subperiod, would be needed to develop a system that includes the element of "said **first non-zero current is determined based on a known ratio with respect to said second non-zero current,**" or "**said at least first and second non-zero current over their respective sub-periods substantially yielding said overall brightness level**."

Neither Friend nor Aoki provides any teaching regarding a lower voltage during the first subperiod, as Friend teaches a full voltage during each "on" time and Aoki teaches a full voltage during the first subperiod. Similarly, neither Friend nor Aoki provides any teaching regarding adjusting time of subperiods or duty cycle to compensate for additional brightness levels. Friend teaches obtaining a desired brightness by corresponding on/off times and Aoki explicitly teaches achieving brightness levels greater than desired brightness levels.

A claimed invention is prima facie obvious when three basic criteria are met. First, there must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings therein. Second, there must be a reasonable expectation of success. And, third, the prior art reference or combined references must teach or suggest all the claim limitations. However, the Court in *KSR v. Teleflex* (citation omitted) has held that the teaching, suggestion and motivation test (TSM) is merely to be used as a helpful hint in determining obviousness and a bright light application of such a test is adverse to those factors for determining obviousness enumerated in the *Graham v. John Deere* (i.e., the scope and content of the prior art, the level of ordinary skill in the art, the differences between the claimed invention and the prior art and objective indicia of non-obviousness) (citation omitted).

In this case, the combination of the cited references fails to disclose at least one material element recited in the independent claims and thus, the combination of the cited references cannot be said to render obvious the subject matter recited therein.

Applicant submits that for the remarks made herein, the reason for the rejection of the independent claims has been overcome.

With regard to the remaining claims, these claims depend from independent claim 1 and, hence, recite subject matter not disclosed by the combination of the cited references.

With regard to the rejection of claims 3, 4 and 5 under 35 USC 103(a) as being unpatentable over Friend and Aoki and further in view of Yamazaki, Applicant respectfully disagrees with and respectfully traverses the rejection of the claims for the same remarks made in the response submitted with regard to the previous Office Action.

For the remarks made herein, applicant submits that the rejection of the claims has been overcome and respectfully requests that the rejection be withdrawn and a Notice of Allowance be issued.

Applicant denies any statement, position or averment stated in the Office Action that is not specifically addressed by the foregoing. Any rejection and/or points of argument not addressed are moot in view of the presented arguments and no arguments are waived and none of the statements and/or assertions made in the Office Action is conceded.

Applicant makes no statement regarding the patentability of the subject matter recited in the claims prior to this Amendment and has amended the claims solely to facilitate expeditious prosecution of this patent application. Applicant respectfully reserves the right to pursue claims, including the subject matter encompassed by the originally filed claims, as presented prior to this Amendment, and any additional claims in one or more continuing applications during the pendency of the instant application.

In order to advance the prosecution of the matter, applicant respectively requests that any errors in form that do not alter the substantive nature of the arguments presented herein be transmitted telephonically to the applicant's

representative so that such errors may be quickly resolved, or pursuant to MPEP 714.03 be entered into the record to avoid delay of the prosecution of this matter.

However, if the Examiner believes that such minor errors in form cannot be entered into the record or that the disposition of any issues arising from this response may be best resolved by a telephone call, then the Examiner is invited to contact applicant's representative at the telephone number listed below to resolve such minor errors or issues.

No fees are believed necessary for the timely filing of this paper.

Respectfully submitted,
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